

AMENDMENTS TO THE CLAIMS

Please rewrite the claims as follows:

1. (Currently Amended) A method for determining discharging state from each nozzle of a head which discharges liquid droplets, comprising:

a driving step of driving each of nozzles of the head to discharge liquid droplets;

a storage step of detecting a discharging state from each nozzle of the head driven in said driving step and storing the discharging state as a physical amount in a memory;

a calculation step of calculating an average value and a standard deviation of the physical amounts stored in the memory in said storage step and obtaining a threshold for determining whether the discharging state from each of nozzles of the head is normal or abnormal, on the basis of ~~the physical amount corresponding to each nozzle and stored in the memory~~ the average value and the standard deviation; and

a determination step of determining whether the discharging state from each nozzle is normal or abnormal, on the basis of the threshold ~~calculated~~ obtained in said calculation step and the physical amount corresponding to the nozzle.

2. (Original) A method according to claim 1, wherein in said calculation step, at least two thresholds for determining whether the discharging state from each of nozzles of the head is normal or abnormal are calculated, and in said determination step, the physical amount corresponding to each nozzle is evaluated on the basis of the at least two thresholds calculated in said calculation step and it is determined whether the discharging state from each nozzle is normal or abnormal, and further comprising:

a decision step of executing said driving step and said storage step again for an undetermined nozzle determined in said determination step not to be non-defective or defective, and deciding a threshold for determining whether the undetermined nozzle is non-defective; and

a step of determining whether the undetermined nozzle is non-defective or defective on the basis of the threshold decided in said decision step.

3. (Original) A method according to claim 1, wherein in said calculation step, at least two first thresholds for determining whether the discharging state from each of nozzles of the head is normal or abnormal are calculated, and in said determination step, the physical amount corresponding to each nozzle is evaluated on the basis of said at least two first thresholds calculated in said calculation step, and determining whether the discharging state from each nozzle is normal or abnormal; and further comprising:

a step of identifying as an undetermined nozzle a nozzle to be driven next to a nozzle determined in said determination step to be defective;

a decision step of executing said driving step and said storage step again for the nozzle identified as the undetermined nozzle, and deciding a second threshold for determining whether the undetermined nozzle is non-defective; and

a step of determining whether the undetermined nozzle is non-defective or defective, on the basis of the second threshold decided in said decision step.

4. (Original) The method according to claim 1, wherein a plurality of neighboring nozzles of the head are divided into blocks, the threshold is calculated for each block in said calculation step, and it is determined whether the nozzle is non-defective or defective for each block in said determination step.

5. (Original) The method according to claim 1, wherein the physical amount includes a discharging time of droplet.

6. (Original) The method according to claim 5, wherein the physical amount includes a delay time until discharged droplet is detected after driving for discharge.

7. (Currently Amended) The method according to claim 1, wherein in said driving step, each nozzle of the head is driven a plurality of ~~number~~ of times.

8. (Currently Amended) An apparatus for determining a discharging state from each nozzle of a head that discharges liquid droplets, comprising:

driving means for driving each of nozzles of the head to discharge liquid droplets;

storage means for detecting a discharging state from each nozzle of the head driven by said driving means and storing the discharging state as a physical amount;

calculation means for calculating an average value and a standard deviation of the physical amounts stored by said storage means and obtaining a threshold for determining whether the discharging state of each of the nozzles of the head is normal or abnormal, on the basis of the average value and the standard deviation, ~~by using the physical amount corresponding to each nozzle and stored in said storage means;~~ and

determination means for determining whether the discharging state from each nozzle is normal or abnormal, on the basis of the threshold ~~calculated~~ obtained by said calculation means and the physical amount corresponding to the nozzle.

9. (Currently Amended) An apparatus for determining a discharging state from each nozzle of a head that discharges liquid droplets, comprising:

driving means for driving each of nozzles of the head to discharge liquid droplets;

storage means for detecting a discharging state from each nozzle of the head driven by said driving means and storing the discharging state as a physical amount;

calculation means for calculating an average value and a standard deviation of the physical amounts stored by said storage means and obtaining at least two thresholds for determining whether the discharging state of each of the nozzles of the head ~~is normal or abnormal, by using the physical amount corresponding to each nozzle and stored by said storage means~~ on the basis of the average value and the standard deviation, wherein one of the thresholds is for determining as normal and another is for determining as abnormal;

determination means for evaluating the physical amount corresponding to each nozzle on the basis of said at least two thresholds ~~calculated~~ obtained by said calculation means, and determining whether the discharging state of the nozzle is normal or abnormal, or undetermined because of the physical amount lying between the one and another thresholds;

decision means for executing processes of said driving means and said storage means ~~again for an~~ again for the undetermined nozzle which is determined by said determination means not to be non-defective or defective, and deciding a threshold for determining whether the undetermined nozzle is non-defective; and

means for determining whether the undetermined nozzle is non-defective or defective, on the basis of the threshold decided by said decision means.

10. (Currently Amended) An apparatus for determining a discharging state from each nozzle of a head that discharges liquid droplets, comprising:

driving means for driving each of nozzles of the head to discharge liquid droplets;

storage means for detecting a discharging state from each nozzle of the head driven by said driving means and storing the discharging state as a physical amount;

calculation means for calculating an average value and a standard deviation of the physical amounts stored by said storage means and obtaining at least two first thresholds for determining whether the discharging state of each of the nozzles of the head is normal or abnormal, ~~by using the physical amount corresponding to each nozzle and stored by said storage means~~ on the basis of the average value and the standard

deviation, wherein one of the thresholds is for determining as normal and another is for determining as abnormal;

determination means for evaluating the physical amount corresponding to each nozzle on the basis of said at least two first thresholds ~~calculated~~ obtained by said calculation means, and determining whether the droplet discharging state of the nozzle is normal or abnormal, or undetermined because of the physical amount lying between the one and another thresholds;

means for identifying as an undetermined nozzle, a nozzle to be driven next to a nozzle determined by said determination means to be ~~defective~~ undetermined;

decision means for executing processes of said driving means and said storage means again for the nozzle identified as the undetermined nozzle, and deciding a second threshold for determining whether the undetermined nozzle is non-defective or defective; and

means for determining whether the undetermined nozzle is non-defective or defective, on the basis of the second threshold decided by said decision means.

11. (Original) The apparatus according to claim 8, wherein a plurality of neighboring nozzles of the head are divided into blocks, said calculation means calculates the threshold for each block, and said determination means determines for each block whether each nozzle is non-defective or defective.

12. (Original) The apparatus according to claim 8, wherein the physical amount includes a discharging time of droplet.

13. (Original) The apparatus according to claim 12, wherein the physical amount includes a delay time until discharged droplet is detected after driving for discharge.

14. (Original) The apparatus according to claim 8, wherein said driving means drives each nozzle of the head a plurality of number of times.

15. (Original) An ink-jet printer comprising an apparatus recited in claim 8.

16. (Original) An ink-jet printer comprising an apparatus recited in claim 9.

17. (Original) An ink-jet printer comprising an apparatus recited in claim 10.

18. (New) A method according to claim 1, wherein in said calculation step, the threshold is obtained by the average value and the standard deviation $\times N$ (N =any one of 3, 4, 5 and 6).

19. (New) An apparatus according to claim 8, wherein said calculation means obtains the threshold on the basis of the average value and the standard deviation $\times N$ (N =any one of 3, 4, 5 and 6).

20. (New) An apparatus according to claim 9, wherein said calculation means obtains the threshold on the basis of the average value and the standard deviation $\times N$ (N =any one of 3, 4, 5 and 6).

21. (New) An apparatus according to claim 10, wherein said calculation means obtains the threshold on the basis of the average value and the standard deviation $\times N$ (N =any one of 3, 4, 5 and 6).

22. (New) A method for determining discharging state from each nozzle of a head which discharges liquid droplets, comprising:
a driving step of driving each of nozzles of the head to discharge liquid droplets;

a storage step of detecting a discharging state from each nozzle of the head driven in said driving step and storing the discharging state as a physical amount in a memory;

a calculation step of calculating a median value and a standard deviation of the physical amounts stored in the memory in said storage step and obtaining a threshold for determining whether the discharging state from each of nozzles of the head is normal or abnormal, on the basis of the median value and the standard deviation; and

a determination step of determining whether the discharging state from each nozzle is normal or abnormal, on the basis of the threshold obtained in said calculation step and the physical amount corresponding to the nozzle.

23. (New) An apparatus according to claim 22, wherein said calculation means obtains the threshold on the basis of the median value and the standard deviation $\times N$ (N =any one of 3, 4, 5 and 6).

24. (New) An apparatus for determining a discharging state from each nozzle of a head that discharges liquid droplets, comprising:

driving means for driving each of nozzles of the head to discharge liquid droplets;

storage means for detecting a discharging state from each nozzle of the head driven by said driving means and storing the discharging state as a physical amount;

calculation means for calculating a median value and a standard deviation of the physical amounts stored by said storage means and obtaining a threshold for determining whether the discharging state of each of the nozzles of the head is normal or abnormal, on the basis of the median value and the standard deviation; and

determination means for determining whether the discharging state from each nozzle is normal or abnormal, on the basis of the threshold obtained by said calculation means and the physical amount corresponding to the nozzle.

25. (New) An apparatus according to claim 24, wherein said calculation means obtains the threshold on the basis of the median value and the standard deviation $\times N$ (N =any one of 3, 4, 5 and 6).